From flexible foam mattress to high-tech products

**The evolution of the mattress**

* **Digital formulation aid**
* **CO2 as raw material**
* **Improved recyclability**
* **Today’s mattresses: more comfortable and environmentally compatible than ever before**

People spend a considerable portion of their lives in bed. Therefore, sleep comfort, convenience and health aspects such as “back friendliness” are important criteria that make mattresses made of flexible polyurethane (PU) foams attractive for customers. Aspects such as environmental compatibility and low emissions also play a key role now. At the [K 2019](http://www.k2019.covestro.com), polyurethane pioneer [Covestro](http://www.covestro.com) explains how rapidly this material has changed in recent decades thanks to continuous innovations developed in its own laboratories, in order to satisfy the ever changing requirements – and what plans the company has for flexible foams of tomorrow.

“The mattresses of today have little in common with the first polyurethane-based, flexible-foam mattresses of the early 1960s. It is like comparing today’s sports cars with the classic cars of that era,” says Dr. Lutz Brassat, a flexible polyurethane foam expert at Covestro. Soon after the discovery and development of the first flexible PU foams by the chemist and capable mechanical engineer Dr. Otto Bayer in Leverkusen, people came to recognize how well-suited it was as a mattress. “From today’s perspective, its comfort qualities were miserable. In addition, due to the additive used during its production, it had to be sufficiently aired out before use,” says Brassat.

Polyurethane developers have done a great deal of work in order to gradually transform the first flexible PU foams into the high-end product that we know today. This is illustrated by an installation at Covestro’s trade fair stand (A 75 in Hall 6), which demonstrates the differences between early flexible foams and today’s top of the range products. And on the displays, the development looks ahead: the furniture of the future will be not only comfortable, but also recyclable and made partly from alternative raw materials.

**New raw materials for ever changing market demands**

Examples of previous “milestones” in the ongoing evolution of the flexible foams sector at Covestro are optimized raw materials, procedures for manufacturing highly elastic cold foam mattresses and the introduction of polyols for the production of viscoelastic foams, which further improve the distribution of forces exerted by a sleeping body.

“Other developments were probably less spectacular, but not any less important,” says Brassat. “The use of water-based adhesives, for example, which allow mattresses made of different foams and of different thicknesses to be joined together to create particularly high-quality orthopedic multi-zone mattresses, without adversely affecting the results of emission measurements.”

Other innovations succeeded in extending the lifetime of polyurethane mattresses and maintaining their good qualities over an ever longer period of time. Due to the current “bed in a box” technology, transporting mattresses has also become more efficient – mattresses are rolled up at the manufacturer; then, at the customer, they quickly unfold to their original size without any subsequent comfort loss, thanks to the minimized compression set of newer, lighter high-end foams.

**“The evolution is far from over”**

The latest highlights for manufacturing exceptionally smart flexible foam mattresses include a “digital product finder,” which enables foam manufacturers to find the ideal raw materials for their products, and cardyon® polyols, which are partly based on CO2 as a raw material.

Also in focus are PU raw materials and manufacturing processes, which solve some of the technical challenges of popular viscoelastic mattresses. Foams with increased air circulation provide a particularly pleasant sleep climate; in addition, their viscoelastic qualities are less temperature sensitive than their predecessors. Other features include further reduced emissions due to reactive catalysts, which are integrated into the polymer chains of the foams.

“All of these improvements – from the first, short-lived flexible foam mattress to the current high-performance product with polyols, such as the Softel® VE-1800 – have been implemented over the years in small, but important steps. What most of them have in common is that they were, and will continue to be, driven by innovation at Covestro,” says Lutz Brassat. “And we are working hard to help consumers sleep even better in the coming years. The evolution of the mattress is far from over.”

**About Covestro:**

With 2018 sales of EUR 14.6 billion, Covestro is among the world’s largest polymer companies. Business activities are focused on the manufacture of high-tech polymer materials and the development of innovative solutions for products used in many areas of daily life. The main segments served are the automotive, construction, wood processing and furniture, and electrical and electronics industries. Other sectors include sports and leisure, cosmetics, health and the chemical industry itself. Covestro has 30 production sites worldwide and employs approximately 16,800 people (calculated as full-time equivalents) at the end of 2018.

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